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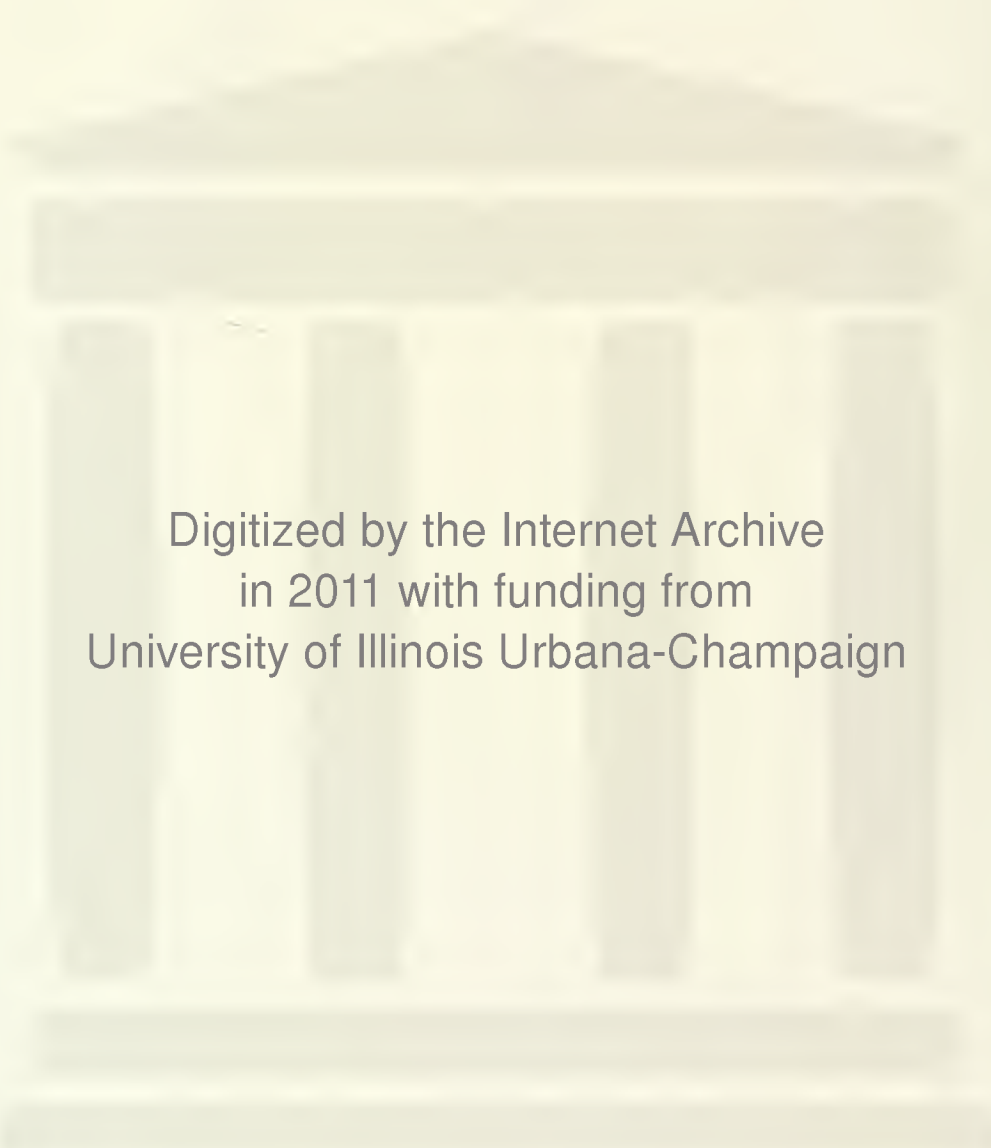
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## Efficiency and Equity Criteria for Educational Budgeting and Finance

*Walter W. McMahon*

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EFFICIENCY AND EQUITY CRITERIA FOR  
EDUCATIONAL BUDGETING AND FINANCE

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Faculty Working Paper #733

Summary

This paper addresses the current concerns with inefficiency in the primary, secondary, and higher educational system by seeking more comprehensive social-efficiency criteria together with corresponding operational measures. Also considered are the problems created by inequity in the distribution of benefits of education among children and college-age young adults in relation to the major criteria for and measures of equity. One new result of this inquiry is the development of the concepts necessary for achieving simultaneous improvements in efficiency and equity, as well as ways to measure the trade-offs between the two in education.

It is suggested that socially efficient, equitable, and hence better, education has the potential for significant longer-run benefits for growth and improvements in the quality of life in the broader society.





## Efficiency and Equity Criteria for Educational Budgeting and Finance

There are new and increased incentives for finding ways to improve efficiency and equity in education. As costs rise, and all education budgets grow tighter, there is an increasing struggle to find resources that can be put to more efficient uses to maintain quality and innovation in education, while also assuring equitable access to all education. This concern with inefficiency when resources are wasted and with inequities such as continuing inequality of educational opportunity is intensified by the fact that new sources of inefficiency and inequity are constantly being created by declining enrollments, shifting job markets, slower growth, and inflation, all reflected in the political climate.

Yet there are important payoffs from reducing these growing problems with inefficiency and inequity. These gains include finding slack resources that can be used to improve the quality of education and to extend educational opportunity. Better education is an important end in itself, but better education also has a strategic role in that it can contribute to humane growth in the entire society.

One response is for education to ignore these problems. Another is to take the position that any attempts to evaluate the efficiency or benefits of educational programs run such dangers of using imperfect measures or of ignoring some benefits, that it is better to keep the criteria hidden and implicit. The suggestions made in this chapter and in other parts of the book in offering partial criteria, however, are not that measurement is essential to the successful application of logical criteria. To omit qualitative appraisals of potential benefits

that cannot now be measured given the current state of the arts would merely favor blind applications. Instead the criteria offered are more like early warning systems, which, when used judiciously, are better than doing nothing, which can perpetuate waste and inequity.

Inefficiency and inequity currently permeate much of primary, secondary, and higher education. Buildings, administrative staff, and teachers are underutilized in schools and colleges as enrollment declines, and this creates numerous sources of inefficiency, waste, and lower productivity. Another symptom of social inefficiency, or inefficiency from society's point of view, occurs because many children are not learning the basics of reading, writing, and mathematics which limits their capacities in other subjects, their access to college, and their lifetime potential. There are also problems with efficiency when in the face of system-wide contraction, lower quality curricula with reduced enrollments become very high cost and yet are preserved. A final example of social inefficiency is seen in the opinion of most when the allocation of scarce educational resources results in large surpluses of educational outcomes that have limited practical, esthetic, or humanitarian uses, such as costly PhD's in fields which are already very low-paid and overcrowded, offering very limited job prospects.

A particularly important source of inequity, which is also endemic to the system, involves the distribution of the benefits of education among pupils. One symptom is the wide differences in benefits traceable to differences in expenditure per pupil among states, among school districts, and within districts--differences in the order of five to one in most of the states--that arise because of the differences in the wealth of the

parents and the neighborhood. These differences are known to purchase teachers with more graduate training, more experience, and better verbal skills, as well as better staff support for children in wealthier districts,<sup>1</sup> while denying educational opportunity to children born in poor neighborhoods. This reduces the chances of the latter for access to college, leads to greater inequity in the distribution of income later, and to reduced chances for these children in life. There are also inequities in the distribution of benefits among college-level students which also have implications for the distribution of income and for distributive justice in society.

Education's strategic role is due to the fact that there are three kinds of returns later to education when it is efficient and equitable that together comprise humane growth--an economic growth of earnings, a growth of non-monetary returns, and a more equitable distribution of income. The contribution education can make to the first component, economic growth, has taken on increased interest in a world deeply concerned about the slowdown in productivity growth and anxious to find less energy intensive means of bringing new technology to bear on production. The second, consisting of non-market, non-monetary returns to education during leisure time hours is an important aspect of improvement in the quality of human life. Finally, improvements in the equity with which the benefits of education are distributed among pupils has an important bearing on the equity with which both the monetary returns and the non-monetary returns are distributed among these same persons later in life, and hence on greater distributive justice.

## I. The Theme

The theme of this chapter, and of this book, illustrated in the foregoing examples, is that improved social efficiency and equity in the entire educational process will contribute to better education for all, and through this to growing contributions to humane growth in the society. Defined in this way, the educational process is not limited to the classroom but includes the home, the neighborhood, and learning on the job. While school and college budgets cannot control these environments, there are elements within them that can be influenced and that need to be included in the planning process if the budgeted activities are to be socially efficient. The goal of better education for all, furthermore, refers to finding the best resource reallocations that can be made toward this end under conditions of limited resources-- that is, this and the following chapters consider possibilities for improvement either of efficiency or of equity toward achieving the best and most equitably distributed education possible under tight budgets.

The task of this chapter is to explain and to seek some improvement in the criteria for achieving greater efficiency and equity in education. Social efficiency and equity criteria are poorly defined, and those criteria that have been operationalized are poorly understood, and hence often not applied effectively. The problems however are difficult, major ones of which are that often a wide enough agreement does not exist among key leaders on what educational outcomes are most desired. Whatever consensus does exist is often understated. There also are not workable definitions, much less accurate measurement, of some of the benefits of education.

Both expenditure and tax-side decisions involve efficiency and equity--both are part of financing education, and both are considered in the chapters that follow. Budgeting decisions made at Federal, state, or district levels each can be viewed as the source of finance from the perspective of the next lower level of education. The educational services provided also have a feedback effect on the financial resources that can be raised. Analyzing the expenditure decisions in the budget as well as the traditional tax side decisions is not only in line with the more recent trends in research in public finance, but it is also in line with the growth in popular concern with the efficiency (and equity) with which resources are used. Each and every education budget decision within a local school, college, state, or nation, in practice, implicitly involves the potential benefits, or effects, in relation to the costs. Furthermore, this budget decision can be regarded as the educational plan for the following year--that is, educational planning implemented within shorter run situations, especially if there is an appropriate integration between educational planning and the budget. Regarded in this way, financing education deals with the heart of the process of securing efficiency and equity in the use of resources as well as in their acquisition.

## II. Criteria for Social Efficiency and Equity

Pareto efficiency is defined as improvements in how resources are used to embody knowledge, skills, and values in persons ("production efficiency"), or to provide education in the kinds and amounts that society needs ("exchange efficiency") in such a way that some are made better-off, but no one is made worse-off.<sup>2</sup> Equity, in contrast, deals with a

different question--the question of the justice with which the benefits of education, or the tax or other burdens, are distributed. The achievement of equity is defined in the purest sense as involving a redistribution of resources where some gain and some lose. That is, if all possible improvements in efficiency have been made so that there are no slack resources available for use, to improve equity would require a redistribution of educational benefits (or of tax burdens) that make some better off, but some worse off, albeit in the interest of greater distributive justice.

#### Efficiency and Equity in Education

Efficiency typically means a potential for increases in the desired outcomes of education without increases in the physical quantities of resources used. Efficiency does not mean "speed up," or increases in the number of pupils per teacher without additional teacher compensation, for such a "speed-up" leaves the teacher worse-off. Efficiency does mean maintaining all outcomes of education while saving costs, perhaps through the application of new knowledge or technology to the learning process--the released resources can be used to make some pupil, teacher, or taxpayer better off, and no one need be worse-off.

Budget changes that redistribute educational benefits among young people involve interpersonal comparisons of the amount of satisfaction gained by some in relation to the amount lost by others before a judgment can be made about whether or not social welfare has been increased. Although typical of most practical situations, these equity judgments lie beyond the realm of pure economics--the basis of the equity judgment

lies instead in philosophy, ethics, and to some extent in legal interpretations.

### Combining Efficiency and Equity

Efficiency and equity are regarded by many as in conflict--that is, the trade-off for an increase in equity is a loss in efficiency. Put the other way around, the trade-off for increasing the efficiency with which pupils learn is restricted access to educational programs. Such trade-offs do exist, of course, and are an important feature of most educational systems of the world. Nevertheless, there are situations in which both improvements in the social efficiency of education, and improvements in distributive justice, can be made simultaneously. This represents a very important situation, for improvements can be made in both without making anybody worse-off in any absolute sense. Less political opposition to such changes can be expected, and we can also be more certain that such changes are moves toward a truly better solution. We therefore will devote considerable attention to defining criteria to guide budget (and tax) decisions toward finding resource reallocation moves of this type.

To summarize this theme, Figure 1 provides a useful frame of reference for relating contributions here and elsewhere on efficiency or equity to the common goal of the best and most equitable distribution of educational benefits attainable under tight budgets. In Figure 1, the horizontal axis represents the benefits or lifetime satisfactions from education received by individual A, whereas the vertical axis represents the lifetime satisfactions from education received by individual B.

Moves toward better education for both are up the hill to the right that is defined by contour lines  $W_0W_0$  and  $W_1W_1$ . But movements toward better education for both A and B are constrained by the limits imposed by the real resources that are available--the efficiency frontier represented by the line BB.

Individuals A and B are also typical of two groups, group A who may be from a poor neighborhood and receives less benefits from education than group B at the starting position, point Z (i.e.,  $A_0 < B_0$ ).<sup>3</sup> The objective is to use the slack resources that exist at point Z due to social inefficiency in such a way as budget and other planning decisions are being made to improve the quality of education received both by A and by B as well as the equity with which it is distributed. The goal is the best and most equitably distributed education attainable within the resources available which is at  $\Omega$ , the point of constrained bliss.

B's Lifetime  
Satisfactions  
from Education

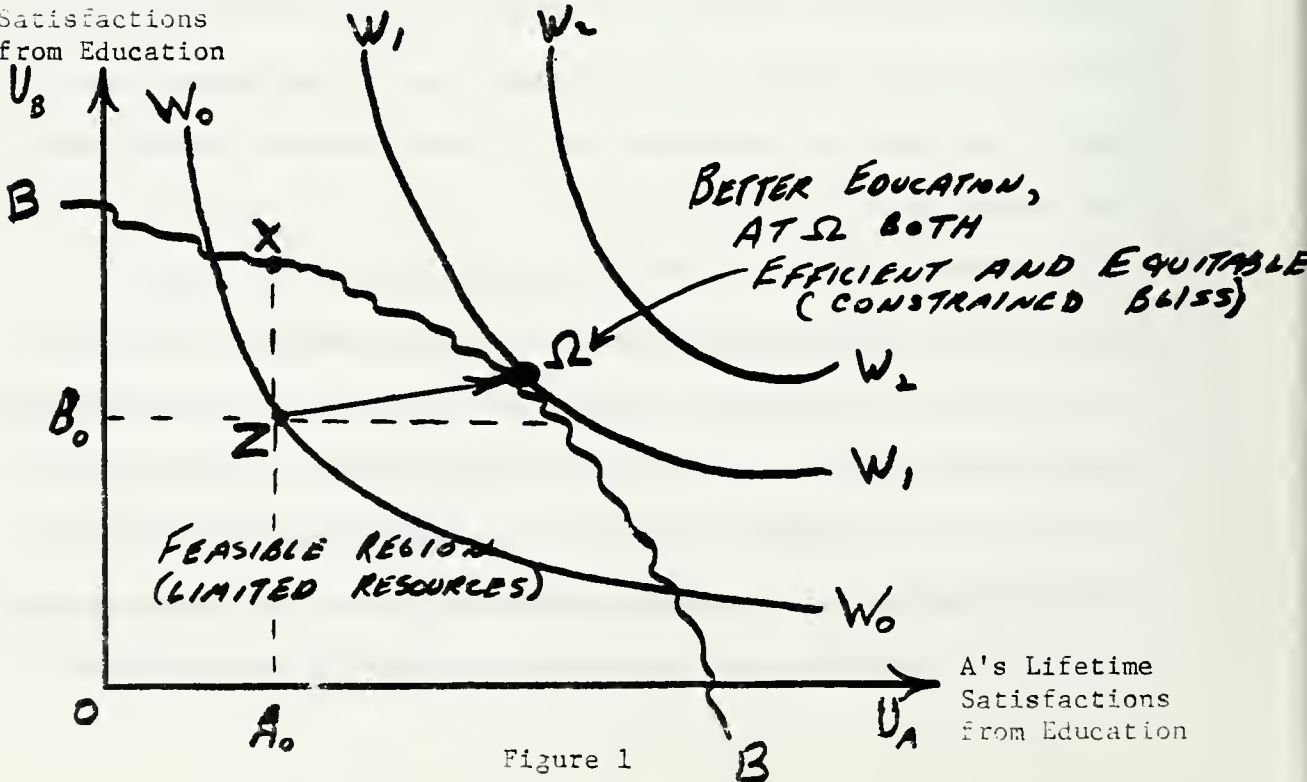


Figure 1



Humane Growth Criteria. A move from Z to X increases efficiency (no one is worse off), from X to  $\Omega$  increases equity (the benefits are more equitably distributed), and a move from Z to  $\Omega$  directly contributes simultaneously to both efficiency and equity, leaving both A and B better-off. We will refer to the latter as a move consistent with humane growth--both within education and in the society at large--and offer humane growth criteria that should be useful in finding moves of this type in practical educational planning at primary, secondary, and college levels. But first, what is wrong with changes in educational planning and budgets designed exclusively to increase efficiency, or to increase equity, taken separately?

The answer is nothing if they are so designed that the benefits exceed the costs. Pure equity moves in educational finance reform such as those from X to  $\Omega$  in Figure 1 redistribute in a way that hurts someone, and therefore generate opposition. A group containing individuals like individual B in Figure 1 who is receiving a better education to start with at point X is left worse-off. Those involved with group B will complain, and others can be expected to join their cause, arguing that the quality education received by this group is being sacrificed for something inferior at  $\Omega$ . The goal of greater distributive justice in this case is impeded in its accomplishment by the inability to be sure that the gains to group A exceed the damage to group B. As tight national, state, and institutional budgets for education are affected by slower growth, improvements in equity and access cannot be financed with new resources and must increasingly be financed by internal budget reallocations like X to  $\Omega$  that generate conflict and thereby fore-doom many educational finance reform efforts.

Pure efficiency moves alone also have pitfalls. They can help to locate and use slack resources, but if done only for an elitist few, the cost is greater relative inequity for others. For example, an efficiency move in Figure 1 such as that from Z to X uses slack resources to improve B's benefits. But after the change is implemented there is even more inequality of educational opportunity and inequity than had existed before.

To avoid these dilemmas, humane growth criteria which combine both efficiency and equity considerations are proposed. These criteria are to be used to seek out those reallocations of resources when making short and longer run budget decisions that either (1) improve efficiency without reducing equity, or (2) increase equity without reducing efficiency. Both of these criteria combine improvements in efficiency with improvements in equity such as those from Z to  $\Omega$  in Figure 1. Full application of these humane growth criteria, of course, somewhat overrestricts the decision space. In many practical situations, there will be at least some adverse side effects on either efficiency or equity. But the literature to date has tended to emphasize the conflict and trade-offs between efficiency and equity so heavily that perhaps a more vigorous effort is justified to find those situations where simultaneous improvements in both can be made. Further operational concepts and measures of efficiency, equity, and humane growth are needed for the practical application of these criteria and will be considered below.

The resources necessary for better education can come from growth in the real financial resources available to education--this is equivalent to a shift outward in the constraint (line BB in Figure 1). But

these additional new real resources are increasingly less available. Instead, educational planners often must allow inflation to act as a cross-the-board tax on the units they administer, and then to carefully distribute nominal increments to a few selected productive programs. In this sense, most budgeting and educational planning is really internal reallocation. Since this has become so common, a premium is placed on knowing where to "allow" budgets to be eroded due to inefficiency, and on knowing where the potential for improvements in efficiency is greatest.

### III. Efficiency Criteria

Efficiency has two major aspects: production efficiency which refers to the efficiency with which inputs of time and resources are combined in the educational process to secure desired outcomes, and exchange efficiency which refers to the efficiency with which appropriate educational outcomes are matched with the citizens' educational needs.

#### Production Efficiency: Technical, Price, and Economic Efficiency Defined

Production efficiency is developed in Figure 2a with two inputs, and in Figure 2b with two outputs, based on a simplified educational production function.<sup>4</sup> For the two-input case, isoquant  $Q_0 Q_0$  illustrates combinations of student time and teacher time used to produce one unit of educational output. This trade-off along  $Q_0 Q_0$ , with possible improvements in the technical efficiency with which student time is used (Z to C) is also illustrated in the chapter by Thomas et. al. where more individualized instruction is found to elicit more student "time on task."

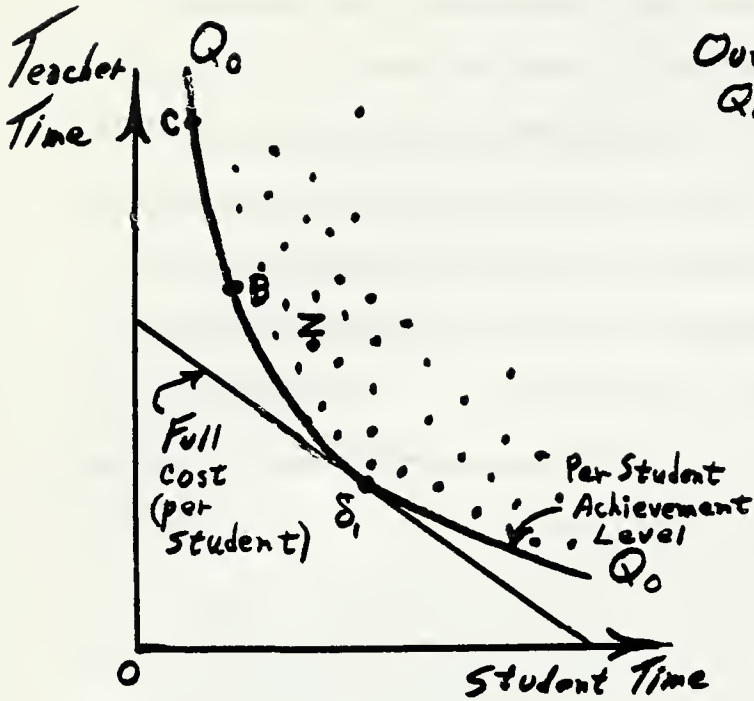


Figure 2a. Two Inputs

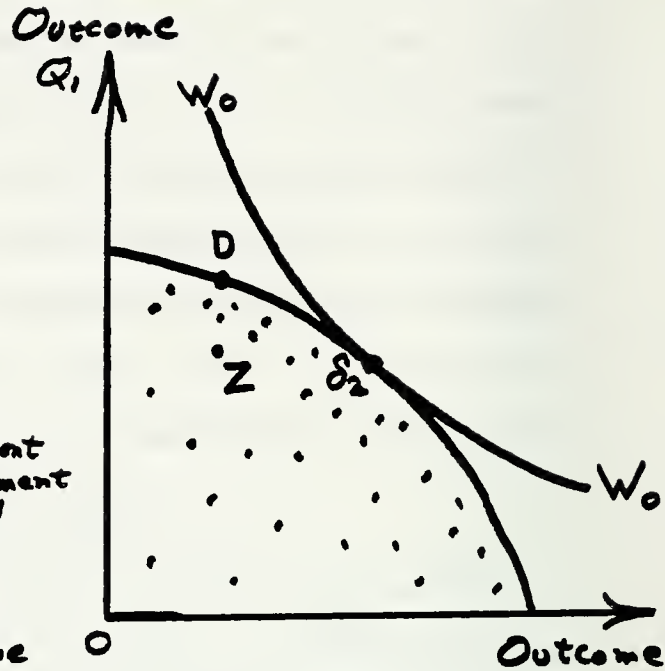


Figure 2b. Two Outputs

The isoquant in Figure 2a is a unit isoquant (with the index of output and all inputs divided by the output index), so that all output dots above  $Q_0$  are less efficient production points. Technical efficiency exists when from point Z, any point down on  $Q_0$  is reached. This requires a reallocation of available resources in such a way that technical efficiency is maximized, such as when teacher verbal skills are used to explain things clearly. Price efficiency involves considering the relative prices of the resources used, as opposed to technical efficiency which ignores the costs. In this illustration, the costs of teacher-time in terms of the salaries required to hire teachers with the necessary skills, as well as the costs of student-time (as measured by foregone earnings) must be brought together with production function

information in a cost-effectiveness analysis before the most price-efficient combination of these resources is found. A movement from Z to B constitutes an improvement in technical efficiency; a movement from B to  $\delta_1$  constitutes an improvement in price efficiency; and only at  $\delta_1$  which combines both, is full economic efficiency achieved.

Production efficiency in education also involves the choice of optimum outputs, among various alternatives, as illustrated in Figure 2b. There is more than one output in education at both the intermediate and final-good levels, with the result that there is both the difficulty and the need to ascertain society's output goals and the weight to be assigned to each. Within higher education, for example, there are instruction, research, and public service; at all levels there are breakdowns by curricular areas and by cognitive and non-cognitive outcomes, as well as the subdivisions of each, that are the focus of educational evaluators. The intermediate instructional outcomes such as student achievement contribute to the ultimate outcomes (or benefits) such as lifetime earnings and non-monetary returns that are the primary ultimate concern of individuals and of the society.

Figure 2b illustrates a choice in the use of resources, with inefficient points below the production frontier such as point Z, so that a movement from point Z to point D constitutes achievement of technical efficiency. There is no pure price efficiency since outputs are not sold for a price on the market, but there is an analogous concept that can be called allocative efficiency. It relates to the attainment of that mix of educational goals given in this case by a beneficent educational administrator's utility function  $W_0W_0$ , representing his best effort

to ascertain society's true goals. These goals are normally not made very explicit, which limits the possibilities for cost-effectiveness, but nevertheless a movement from point D to point  $\delta_2$  constitutes an improvement in allocative efficiency. To make such moves requires that the educational policy maker's goals, and also society's goals as represented through school boards, legislatures, Congress, and public opinion polling be ascertained with some care.

Cost effectiveness decisions such as the four types illustrated in Figures 2a and 2b are made every day by vice chancellor's for academic affairs, department heads, school district superintendents, and school principals. But the cost effectiveness analysis that is done is normally implicit rather than explicit, and it normally does not go by such a formal name. More explicit formal attempts at cost effectiveness analysis and at goal programming are considered by Richard Rossmiller and Elchanan Cohn later in this book. Effective informal use of the framework above, together with the production function information that underlies it, does require that useful cost effectiveness analysis depends heavily on making an effort in each educational institution and state to study the costs in relation to the outcomes. It also would encourage at least trying to place socially acceptable weights on the various immediate and ultimate educational outcomes.

Exchange Efficiency: Technical, Allocative  
and Economic Efficiency Defined

Exchange efficiency, in contrast to production efficiency, deals with the exchange or delivery of a given amount of educational services to families. It involves changes in the structure of the educational

program, or numbers of students in each field, until there is a better fit to the needs of students and of the society. The total return possible from education as was given by the level of line BB in Figure 1 depend in part upon how efficiently the outcomes of the educational system are designed to meet true individual and social needs.

Human capital skills cannot be exchanged among students since human capital is embodied in individuals. But as new skills and new technology are embodied in persons, in a putty-clay fashion, there is great potential for increasing exchange efficiency in education. Exchange efficiency can be improved, meeting private and social needs more accurately, as students are allocated efficiently among classes and institutions, as special education programs try to match programs with needs and abilities, and as informed choice of institutions and majors is exercised by college students. Exchange efficiency is sometimes impeded by budgeting and financing decisions such as those that overly limit resources in medicine and other fields, partially in response to debatable studies suggesting that a surplus is being trained without explicit reference to the expected future returns in relation to the costs. Similarly, if exchange inefficiency is to be reduced, local schools should train more apprentices for entry into crafts such as plumbing where craftsmen are in short supply and unions try to limit entry. Exchange inefficiency is also evident when widely different monetary rates of return to education are found in different college-related occupations.

On the other hand, the development of community colleges and of the Federal Basic Economic Opportunity Grant programs have encouraged

exchange efficiency (in addition to equity) by widening the range of options available for student choice, both among curricula and among institutions. Students are reasonably knowledgeable about their longer run best interests, but unreasonable barriers to entry continue to persist in some curricula. These barriers are enforced by overly restrictive budget limits and other types of quotas, even where returns are high in relation to the costs, coupled with over-enrollment and budgets adequate to support low entrance standards in less needed fields, promoting social inefficiency.

#### An Efficiency Criteria Hierarchy

Overall efficiency criteria are essential to determine if each practical budget decision in the financing of education will or will not improve economic efficiency.<sup>5</sup> The following efficiency criteria hierarchy is suggested, ranked from the lowest efficiency criterion to the highest. Each stage is a partial criterion, so only by going the full distance to include some qualitative evaluation of all of the benefits and their relative weights can full social efficiency be attained.

1. Accountability Tests. Lower level efficiency criteria consist of normal financial accounting controls and accountability checks on whether processes that are financed are being performed by the unit. If the services are not delivered, even basic efficiency is unlikely to be achieved. But these criteria alone fail to analyze the production-effectiveness of what is done, much less analyze whether it is cost effective. Competency testing goes somewhat farther in that it tries to measure at least some outputs, rather than only inputs.



2. Production Function Analysis. This is an effort to try to determine what is effective in producing the desired educational outcomes. It can range from trial and error (what works) to the production function relationships of the types discussed by Thomas et. al., Benson, Rossmiller, and used in Cohn's model in chapters that follow. Such knowledge of what does and what does not contribute to learning helps schools and colleges to be efficient by developing productive activities and avoiding those that are unproductive.<sup>6</sup> Although necessary for efficiency, action using these relationships from production function studies still is not sufficient to attain the highest level of economic efficiency, since the latter also requires consideration of the costs of the inputs involved and the relative value of the outputs.

3. Cost-Effectiveness Analysis. Costs are considered in relation to the quantities of output obtained. Cost-effectiveness analysis uses the prices of the inputs but in the past some of the costs have been omitted, such as the cost of student time. Frequently, only intermediate outputs such as instructional units are analyzed, whereas longer run outcomes such as the current and future demands for graduates in the field are ignored. However, even with these limitations, if the decision maker's goals are well conceived, cost-effectiveness ratios can be helpful guides to increased efficiency. One example might be the comparisons now being made by state agencies of the cost-effectiveness of producing instructional units of comparable quality at different colleges or schools within each state. With state-wide retrenchment, low

quality curricula often lose enrollment first, losing the advantages of scale, and become very high cost per student.

4. Cost-Benefit Analysis. Costs are considered in relation to the expected value of outputs, and either benefit/cost ratios, or rates of return (which are a form of benefit/cost ratios) are calculated. The main problem is that as developed thus far, the measurement of expected future benefits is usually limited to monetary earnings because they are the more easily measurable part, although full costs are normally considered. There is also the need to predict expected future job market trends and their implications for rates of return so as not to rely too heavily on the past, although there is some evidence that the returns expected by students at least in the medium term future and the expected rates of return based on these are reasonably accurate.<sup>7</sup> Differences in the actual monetary rates of return to education over time, by type of occupation, and by type of institution do tend to persist however, and are suggestive, as are the expected rates of return that anticipate major trends of low rate of return and high rate of return fields at different types of institutions. These differences are developed further in the chapter by McMahon and Wagner.

One criterion is to suggest that where expected rates of return are high in relation to alternatives there is a good investment opportunity, assuming that all of the nonmonetary returns and social benefits can reasonably be assumed to be positive, or at least zero. A second criterion is to attempt to adjust the monetary rates of return by including, judgmentally, specific non-monetary private returns of such

types as those surveyed by Robert Michael. They should in principle be included in the final qualitative judgment made about total benefits.

5. Cost-Benefit Analysis with Social Benefits Included. The highest level efficiency criterion from the point of view of society as a whole must consider the full social costs as well as the full expected benefits to society when calculating more comprehensive rates of return or other benefit cost ratios. The student needs to think only about the private benefits and private costs to himself and his family in making his investment decision. Educational administrators, and school boards, boards of higher education, and legislative bodies whose responsibility is to think about all persons in their jurisdiction should consider the full benefits, including the benefits of research to future generations and the spillover benefits from education to society. A partly-social benefit that has become more pertinent recently due to the widespread concern with the slowdown in economic growth is the larger potential contribution education could make to economic growth if curricula were organized more efficiently to this end. In Japan and Russia, for example, much more high school science and math is required, more college students are trained in areas related to economic productivity such as engineering and science, there are higher literacy rates, and lower drop out rates. Another important social benefit was cited by Thomas Jefferson who urged public support by the State of Virginia for public education as the key to securing effective individual participation in the democratic process and hence as the key to the preservation of our freedoms. These types of social benefits are .

undoubtedly the hardest kind to measure, but they can nevertheless be observed and are real.

### Use of Social Efficiency Criteria

Detailed measurement is not essential to the successful application of these efficiency criteria. They are continually being applied implicitly at all levels, without much measurement or use of their formal names, as decisions are made--it is only that increasingly more conscious consideration of the costs in relation to effectiveness and longer run benefits only can help to improve efficiency. The use of the criteria, with or without formal measurement, involves considering (a) effectiveness in relation to cost, then (b) longer range monetary and psychic benefits of the degree in relation to cost, and finally (c) qualitative judgments that include social benefits to obtain full ultimate benefits in relation to cost as a basis for decisions, all the while seeking to avoid reducing equity.

Many indices of effectiveness are used by educational evaluators that could become a part of cost-effectiveness tests by being related to cost. The cost per instructional unit in the same discipline across institutions is one common example. University departments also have research outputs, which in experimental studies are conceived of in terms of the cost per referred publication or weighted "research unit." Research effectiveness is evaluated internally by committees on program evaluation, promotion committees, and research-support committees, whose recommendations then are related to costs before final decisions are made. There are in principle also "public service units" resulting

from public service, a separate third output. Another commonly specified index of instructional effectiveness is a measure of the increments to scores on standard achievement tests covering basic skills, science, social science, and humanities. When a sufficiently comprehensive index of effectiveness is specified, such as these test-score increments, the cost-per-unit in principle can be estimated, and social efficiency increased by gradually transferring resources from the less cost-effective approaches to the more cost-effective ones.

By moving toward more comprehensive concepts of the longer run monetary and psychic benefits of education, or "full earnings" used in benefit-cost criteria, further improvements in social efficiency can be achieved. This assumes that some estimate can be made of the value of the psychic benefits, or that they are greater than zero, resulting in an index that is more comprehensive than the index of effectiveness. Then total rates of return can be estimated that do provide some guidance-- they still must be supplemented with medium term 3-5 year projections and with qualitative judgments about the social benefits of each program. The result is a higher order criterion for increasing social efficiency by allowing those programs to gradually contract where the expected adjusted total rates of return are lowest, and by allocating more resources to the expansion of those programs where the expected adjusted total rates of return are highest.

#### IV. Equity

The poor quality of the education and the poor results being achieved in the urban ghettos and other poor neighborhoods in the United States is a national and international disgrace. It leaves a

heritage of costs and inequity for the future--overloading the welfare system, filling up the jails, contributing to low productivity growth in the U.S., and limiting the earning capacity and life chances of many. There is an intergenerational transmission of these costs and of inequity.

Concern with equity among all children at each age (child equity) and with equity among taxpayers (tax equity) has dominated the literature in school finance, whereas the literature on financing post secondary education has tended to be more specialized either on efficiency or on equity. The attention given to efficiency and its combination with equity in this book therefore represents a considerable departure.

Improvements in efficiency can be a source for financing improvements in equity from internal sources, an important fact in this era of tight budgets. Furthermore, some inequity is due to inefficiency in the schools in poor neighborhoods--how much is hard to say, but improvements in the social efficiency of these schools would simultaneously increase equity.

To suggest some of the problems, the persistence of child inequity is suggested by indices of inequality (or dispersion) of expenditure per pupil among schools and among districts--inequality so vast that expenditure as noted in Windham (1979, p. 81) was 23 times higher in rich districts than in poor districts in Texas, Wyoming, and South Dakota, for example, before the inflation of the late 1970's and 1980's widened inequalities in these and other states. Inflation increases local property values more in property rich districts, thus increasing local property assessments, the inequality of local property tax receipts,

and child inequity. Unless initiatives are taken by state governors and other key policy makers to support school finance reforms in response to the strains of inflation, property taxpayer revolts are another result.

In urban ghettos, the problems with child inequity have not been overcome by Federal categorical programs such as Head Start, Title I, or Community Development (housing) programs. Thus far these programs have not been sufficiently effective in dealing with problems in urban ghettos and poor neighborhoods, and poor educational results. There are however successful experiments underway such as the one in District 13 (Beasley) of south Chicago which requires contracts with parents to see that homework is completed, bedtimes are enforced, and TV time is limited. The results are impressive, and consistent with the research results reported by Benson in a later chapter who finds that poor parents are just as concerned about their children and spend just as much time guiding their children as higher SES parents. To relate Benson's findings to improved child equity and school achievement, need-based education grants to parents could require learning contracts involving a parental commitment to see that homework is done (using Benson's findings) while facilitating more parental involvement and choice among schools as discussed by Schultz. The Federally-sponsored 842 equity studies are also significant, but have not yet led to comprehensive state-level reforms. As yet no President or political party has come forth with a comprehensive approach to the underlying school efficiency and school financing problems troubling the low income neighborhoods nationwide.

In post-secondary education, the problems associated with child inequity and tax inequity have eased somewhat in the United States, due in part to the expansion of Community Colleges which improved access and reduced the inequity for those who had previously been excluded. Similarly, the careful calibration to financial need of the Federal Basic Economic Opportunity Grants since the 1972 Act has been a significant factor reducing inequity among young people. Colleges still inherit problems caused by inequity in the financing of the common schools, <sup>but</sup> college-age students have a somewhat freer choice, even though they are still heavily dependent on the income of their parents. In the Hansen-Weisbrod (1969) study, the inequity on the tax side which they also cite has been reduced somewhat as more states exempt food from the state sales tax, as public institutions raise their tuition in the high-cost high-return programs, and as those students in the latter programs (such as medicine) make more extensive use of new student loan programs. These equity features of the U.S. system of higher education finance have not permeated Europe or other countries nearly so extensively. Even though this book focuses primarily on U.S. education, equity problems persist elsewhere. In the U.S., however, the child equity problems appear to be considerably more acute than in Europe at the primary and secondary level, with spillover effects on the colleges and on society.

#### Types of Equity

Equity is defined as involving a redistribution of resources (or of costs) designed to approach the community's philosophical and ethical standards of fairness. This was previously illustrated in Figure 1 as



a redistributive move from point X to point  $\Omega$ , the latter representing society's judgment of an ethical and equitable distribution of benefits (or of costs) between A and B, and hence the point of constrained bliss. Such redistributive moves can be designed to achieve either:

1. horizontal equity, generally held to require equal treatment of equals (and accepted as having this meaning here), or
2. intergenerational equity, in-between horizontal and vertical equity, and a case of considerable importance in education, or
3. vertical equity, requiring unequal treatment of unequals, in ways to be discussed.

A fully equitable solution (such as at point  $\Omega$ ) would require that horizontal, intergenerational, and vertical equity be achieved. These concepts of equity can be applied to equity among all children or young adults in each age-bracket whether in school or not which we will refer to as child equity. They can also be applied to equity among teachers, administrators, and other staff which we will refer to as staff equity, or to equity among taxpayers or others who bear the costs of education which we will refer to as tax equity. Staff equity is also important, but it is not dealt with in this book because it raises different issues of personnel administration, morale, and productivity, and different complementarities and trade-offs between equity and efficiency.

### Horizontal Equity

The above definitions of horizontal and vertical equity are standard, but stressing the distinction will make clear that some measures of equity that are in use introduce elements of both. It is

suggested here that the most practical operational measure of horizontal equity is real current expenditure per child. This needs to be defined further, and modified with considerations relating to inter-generational equity, but the latter gets into the equalization of ultimate outcomes and vertical equity criteria that follow. The initial and probably most important criterion is that if there is equal real current expenditure per pupil among groups of young persons with essentially comparable abilities, there is horizontal equity. Measures of the degree of inequity or inequality include the full range, restricted range (95th to 5th percentile range), variance, coefficient of variation, mean deviation, and the Gini coefficient. The Atkinson (1970) index merits special attention since it is capable of weighting the ends of the distribution to include vertical equity, and the bottom 10 percent or so is of special political and practical interest.

Expenditures should be current expenditures, not including the more erratic capital outlays. From the point of view of economic logic, these expenditures should also include an element for the current cost of capital, reflecting bond interest and other current imputed costs of the capital invested in buildings. For measures of horizontal equity, expenditure per child furthermore must be compared for like groups-- groups with comparable proportions of disadvantaged pupils, or of high ability pupils. Within or among educational systems, pure horizontal equity tests would involve comparing expenditure per pupil in primary schools with that in other primary schools, high schools with high schools, comprehensive districts with comprehensive districts, college discipline with college discipline, etc.<sup>8</sup> The weights often applied to

different pupils at different levels to reflect differences in per-pupil costs involve, in part, a cost-benefit criterion but also a vertical equity principle.

Measurement of horizontal equity using expenditure per pupil should also, in principle, be in real terms to remove the effects of geographical price level differences, particularly in relation to teacher and staff salaries which account for 70-80% of most educational costs. Geographical differences in the cost-of-living affect the salaries that it is necessary to pay to attract teachers of comparable quality. The result would be toward equalization of the real resources purchased, and hence the quality of education provided. This can be done by dividing expenditures by a cost of education or cost-of-living index. Cost-of-living indices are correlated with the prices of the other things schools buy, and are now available for all states and, by relatively simple extensions for counties and school districts in any state by methods reported in McMahon and Melton (1978, 1981).

Operational measures for horizontal equity among taxpayers logically focus on the tax rate paid by individuals, who ultimately pay all taxes and are the ultimate object of any concern with equity, expressed in relation to their ability-to-pay. The most basic operational criterion for horizontal equity among taxpayers is equal tax rates for all of those who are essentially equal with respect to their real income and wealth. This basic criterion has been reinterpreted and limited in many school finance laws to equal property tax rates across districts as a measure of effort and tax equity. But this criterion ignores the point that equity refers to people and not districts, and also ignores

differences in income which are an important source of differences in the ability-to-pay and in property tax rates. There is the further problem that proportional tax rates when combined with typical assessment procedures result in a regressive tax incidence, at least unless combined with circuit breakers that exempt low income persons. School districts are normally given real property as their legal tax handle, but taxes are paid out of income and are ultimately paid by individuals in relation to their properly measured ability-to-pay, facts that when ignored result in horizontal inequity among individual taxpayers.

### Intergenerational Equity

When equity concepts are applied to the outcomes of education, however, they go beyond equality of opportunity and horizontal equity since student abilities and parental abilities-to-pay are in fact unequal. Student abilities, parental education, and wealth all contribute to the skills and knowledge accumulated, or to human capital formation from a human capital perspective. These skills and knowledge, or the credentials that measure and advertise them, contribute to higher earnings later in the life-cycle of the student. An interesting alternative outcome to be considered, therefore, is the expected lifetime "full earnings" of the student, defined here as the student's earnings from his labor plus his or her non-monetary returns from education during leisure time hours. To achieve a degree of vertical equity among those ultimate outcomes would be to seek to avoid burdening the children with the "sins" of their parents--as does fiscal neutrality--that is, to reduce the intergenerational transmission of inequality.

This choice situation is illustrated in Figure 3. Here children with lower income parents (and/or with lower ability) are confined to transformation curve  $Y_0Y_0$ . They have lower future full earnings at  $E_0$  ( $<E_1$ ), and are less well off at  $\Omega_0$  on  $W_0W_0$  that those with higher lifetime returns at  $\Omega_1$ .

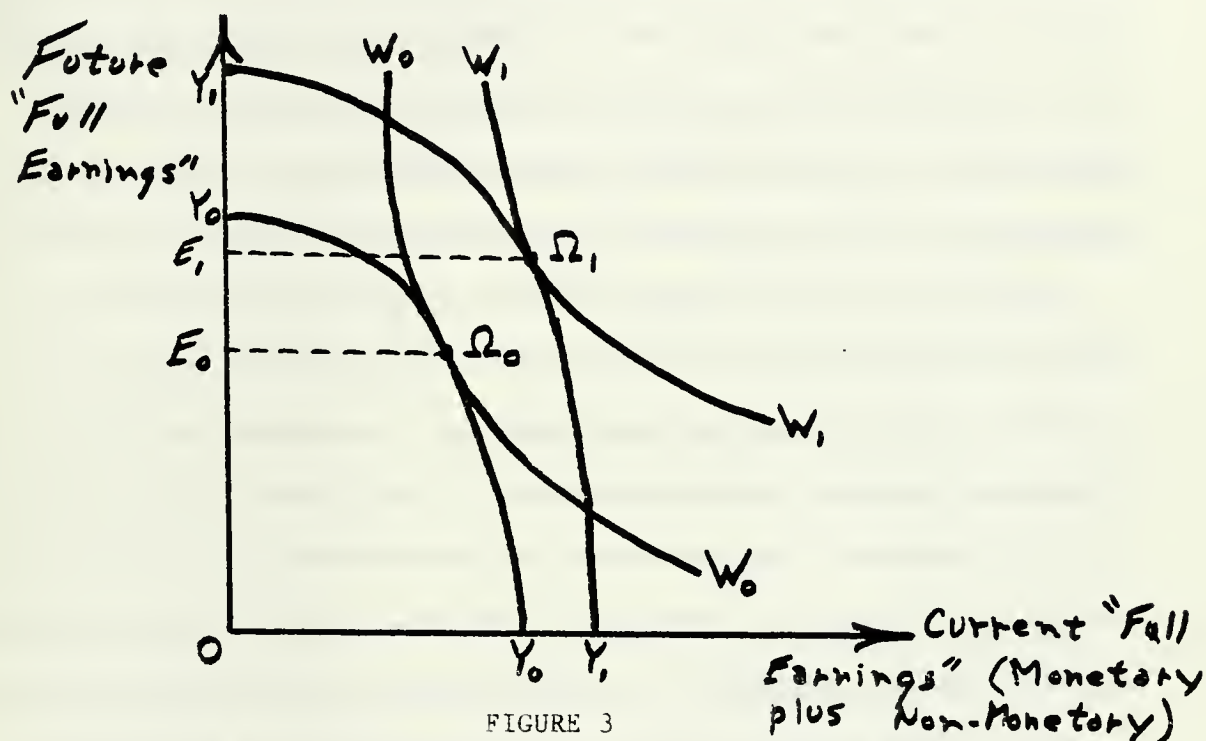


FIGURE 3

There now have been hundreds of research studies of earnings functions that develop ever-expanding evidence to the effect that improvements in the quantity and quality of schooling significantly increase earnings later (e.g., Windham (1979, pp. 1-31), Psacharopoulos (1972), Appendix B to Ch. 5 below, etc.). Other factors that also contribute to inequality in earnings are emphasized by the dual labor market hypothesis and the screening hypothesis, although both sieze on factors

that are correlated with and considerably overlap measures of the quantity and quality of schooling.<sup>9</sup> The radical approach also emphasizes factors that overlap measures of education such as social class, that reflects family income and which in turn is well known to be a key determinant of the quality and number of years of education received. There are some effects on earnings from things other than education of course, including monopoly rents, screening, and chance events as surveyed by Sahota (1978). Earnings inequality also is not the same as income inequality since income includes rent, interest, profits, and inheritance as additional major sources of property income inequality.

The point is that since the quantity and quality of education affect earnings later in life, vertical equity decisions that seek to achieve equity in the ultimate outcomes need to consider earnings and non-monetary returns to education later in life. That is, the choice of an equity principle discussed below for the treatment of children whose parents are unequal and its effect on the intergenerational transmission of inequality is an important dimension of all vertical equity criteria.

Fiscal neutrality now also can be interpreted as an intergenerational equity concept, as was the equality of educational opportunity above, in the sense that both seek to break the link between the parent's wealth and the student's future. Neither, however, undertake to correct for starting disadvantages that may come from limited learning opportunities in the home and neighborhood experienced by the student.

#### Vertical Equity

Since the concept of equal treatment of equals appears to be relatively widely accepted, the choice of an equity principle narrows down to

the choice of a principle to apply to intergenerational equity and to vertical equity, which is concerned with the unequal treatment of unequals. In the vertical equity hierarchy presented below, these principles range all the way from commutative equity--which would leave undisturbed the inequalities produced by inheritance and by markets--to positivism which would be sharply redistributive to correct for initial disadvantages.

Goals such as equality of educational opportunity and fiscal neutrality again lie somewhere between these two extremes. Empirically, student equity at primary, secondary, and college levels tends to fall somewhere between commutative equity and these middle level goals, although undoubtedly examples could be cited of individual special education programs that tend to be positivist and others that are commutative in their orientation. One of the chapters in this book will be found to tend somewhat more toward a commutative orientation (Schultz), one toward a positivist (Alexander), and several toward the middle level fiscal neutrality, equality of educational opportunity, and proportionality positions (e.g., Due, Carroll, and Nelson).

On the tax side, this hierarchy is perhaps most closely analogous to regressive, proportional, or progressive tax rates. Corresponding to this, on the benefit side are regressive, proportional, or progressive rates of benefit. The latter corresponds most directly to positivism in equity as developed by the philosopher John Rawls (1977), since it involves the effort to correct social wrongs borne by the child for which he is not responsible.

Operational measures of vertical equity among children are more difficult to develop because it requires a difficult judgment about the value of the benefit of education (or intensity of the need) among children who are unequal. It is easier on the tax side where the operational measure is merely the tax rate, when once the ability-to-pay has been measured properly as discussed above. The benefit-rate among unequals can be approximated by calculating the percent of real current expenditure spent per member of the special population, and asking whether it is larger than, equal to, or less than the percent spent per member of the regular student population. An equal percent would correspond approximately to fiscal neutrality or to equal educational opportunity, whereas a larger percent spent per pupil on the disadvantaged or handicapped students would tend toward being a progressive rate structure of the type required by a positivist equity principle.

#### An Equity Criteria Hierarchy

Choice of an equity principle from the equity criteria hierarchy that follows, and determining which is the highest and which the lowest level, depends upon the philosophical and ethical views of the community, sometimes as reflected through the courts. Given this, if an improvement in equity can be made without a reduction in efficiency, a contribution can be made to humane growth.

1. Commutative Equity. This first level of equity implies that the state leaves undisturbed the results of the market place. In its most extreme form, it leaves little room for public schools at the local level, because tax supported schools do redistribute benefits among



families. Most practical positions on commutative equity would localize school finance, rather than do away with public schools. Presumably private scholarship funds would be used only to attract the most able students and student need would not be considered. This laissez-faire approach implies emphasis on pure competition and opposition to monopoly, including steps to reduce both private and public monopolies, allowing competition to eliminate the inefficient units. The problem is that the commutative equity criterion allows unlimited differences in wealth among parents to persist, unlimited differences in expenditure per child, and reduces but still permits considerable intergenerational transmission of inequality.

2. Fiscal Neutrality. At this second level of equity, the state seeks to achieve a degree of equity through transfer payments so that local school districts, community colleges or individual students (in the case of need-based education grants) are treated as though they had access to an equivalent amount of wealth per student. After attainment of an equal fiscal base (which seldom is attained under current practices) unlimited variation in local effort would be permitted, as would unlimited variation in expenditure per pupil. State school finance systems generally go beyond commutative equity and part of the distance toward fiscal neutrality. Similarly, the financing of higher education goes beyond commutative equity through the use of grants and aids based on need such as private scholarships, low interest loans, work study, state scholarship commission grants, and Federal BEOG grants. But higher education also falls short of fiscal neutrality, for the income of parents is still an important determinant of the

quantity and quality of the college education received. The achievement of fiscal neutrality should move the current system toward greater horizontal equity, a higher level of vertical tax and student equity, and toward less intergenerational transmission of inequality.

3. Proportionality. This requires equal effective tax rates in relation to ability-to-pay,<sup>and</sup> benefits that are proportional to need on the expenditure side. Among students who are unequal, a clear definition of proportional vertical equity is more difficult because it is hard to measure need from smallest to greatest. But it does imply a larger percent of total expenditure per student spent on the disadvantaged students than on the regular students through special education programs. This degree of rectification, however, presumably would not preclude the more able from moving ahead more quickly, or completing advanced degrees more frequently. This level of equity most closely corresponds to equality of educational opportunity. It still allows for differences in total expenditure based on differences in tastes among families given that some are myopic and others are more far sighted, as well as on differences in innate ability. This level would severely reduce but not eliminate intergenerational transmission of inequality of earnings.

4. Positivism. The fourth-level equity criterion implies progressive rates on both the tax and benefit sides. This is Rawlsian equity, designed to have a corrective effect on the current income distribution, and to assist positively the least advantaged. It would imply full financing by the state of high-cost programs for handicapped or disadvantaged children, BEOG grants for the poor, and affirmative

action. Finally, this level of positivism also implies a correction for those individual cases where parents and students have myopic tastes. Hence positivism provides for intergenerational equity should the parents' welfare function  $W_0W_0$  in Figure 3 above be too short-sighted and hence too close to the horizontal axis. This fourth and final level of equity thereby implies elimination of the intergenerational transmission of inequality, and attainment of intergenerational distributive justice among peers.

#### Maximum Social Benefit

Finally, the "equal-sacrifice" equal-benefit doctrine with its long tradition in public finance (e.g., Edgeworth, 1925, pp. 100ff), when the common assumptions of diminishing marginal utility of income and of benefit are made, is the economists' counterpart of Rawls' positivism.<sup>10</sup> It says that to minimize the aggregate sacrifice borne by taxpayers, and to maximize the aggregate benefits from education received by children, "equal sacrifice" logically has to be interpreted as equal marginal sacrifice, and "equal benefit" similarly must be interpreted as equal marginal benefit. To equalize real costs and real benefits at the margin requires progressive tax and benefit rates--or positivism.<sup>11</sup>

The courts have sometimes taken as a positivist stance, such as in *Levittown v. Nyquist* (State Supreme Court of New York, 1978), and sometimes something less than that, as is developed further in Alexander's chapter.

#### V. Humane Growth Criteria

The contributions of education and of academic research to humane growth in the society include their contributions to full earnings and

to non-monetary social benefits which are important to both national growth and the quality of human life, as well as the contributions of access through intergenerational equity and new knowledge to distributive justice.

### Efficiency and Equity As Joint Products

The challenge is to bring together efficiency criteria and equity criteria, especially by locating the more limited situations where they are joint products. The successively more comprehensive criteria for efficiency, equity, and humane growth are listed below. Together with the operational measures for most that have been discussed above, they can be applied judgmentally by both small unit and larger area administrators and educational planners without further measurement, since further measurement is not always practical (especially at small unit levels), by drawing on existing research studies.

#### An Efficiency Criteria Hierarchy

1. Accountability
2. Production Function Relationships
3. Cost/Effectiveness Criteria
4. Cost/Monetary-Benefit Criteria
5. Cost/"Full"-Earnings Criteria
6. Cost/"Full"-Private-and-Social-Benefit Criteria

#### An Equity Criteria Hierarchy

1. Commutative Equity
2. Fiscal Neutrality
3. Proportional Equity
4. Positivism

#### Humane Growth Criteria

1. Improvements in efficiency, with no reduction in equity.
2. Improvements in equity, with no reduction in efficiency.
3. Improvements in both efficiency and equity.

Choice of one of these humane growth criteria for practical application will limit policy changes quite severely to that area where efficiency and equity are complementary. This is illustrated again in

Figure 4 (from Figure 1) as the shaded area  $ZX'\Omega$ . To summarize, starting at point Z, improvements in efficiency consistent with humane growth criterion #1 above would limit budget changes to those above line  $Z\Omega$  and to the right of line  $ZX$  so that neither A or B are made worse off, (criterion #5 for Pareto efficiency). To avoid reducing equity, however, the region is further limited under equity criterion #3

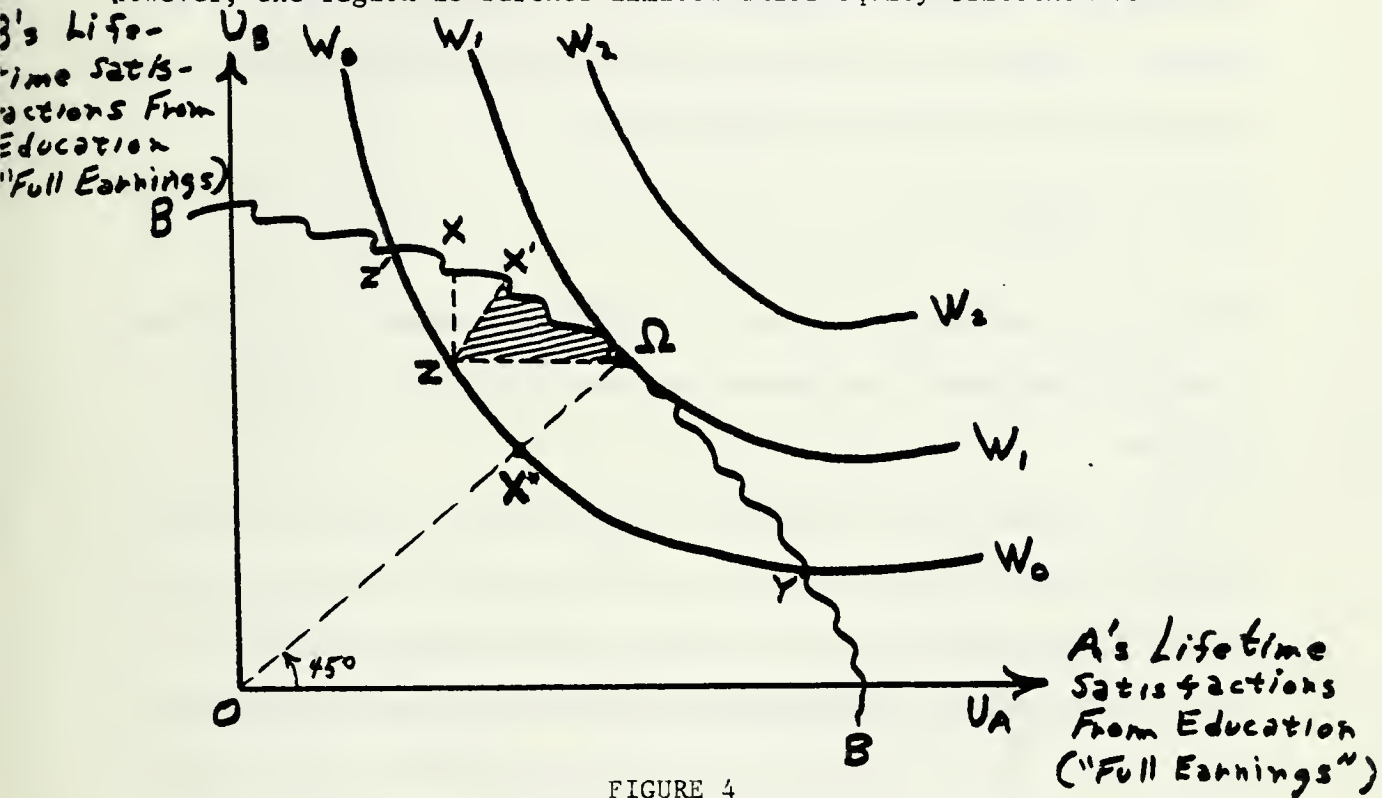


FIGURE 4

to the shaded area to the right of line  $ZX'$ . Using humane growth criteria #2 above, improvements in equity would occur when moving to the right from line  $ZX'$ , but parallel to line  $Z\Omega$  to avoid reductions in efficiency. A joint improvement in both equity and efficiency occurs in any move upward from point Z and to the right of  $ZX'$ .

Efficiency and Equity Trade-Offs

To go beyond this gets into the delicate trade-off between inefficiency and equity. Starting with Atkinson's (1970) equality measure, he

defines equality in such a way that the measure of inequality (in contrast to the Gini coefficient) is specifically related to the Welfare Function,  $W_0W_0$  in Figure 4. To simplify, if point  $Z'$  is the current distribution of full lifetime earnings from education between A and B, Atkinson would merely define equivalent earnings as any other point along  $W_0W_0$ . Noting that these equivalent earnings are equally distributed at point  $X^*$ , and average actual benefit is approximately at  $\Omega$ , then Atkinson's measure of inequality is:

$$(1) \quad A = \frac{OX^*}{O\Omega}$$

That is, the distance  $\Omega X^*$  measures the efficiency-loss in total benefits from education due to the greater inequality and child inequity at point  $Z'$ .

This is a theoretical framework for widening the range of budget decisions beyond those where there is a joint gain in efficiency and equity. The humane growth criteria 1-3 conservatively limits the region for planning, budgeting, and financing decisions to area  $Z\Omega X'$  where little opposition can be expected because nobody is made worse off--efficiency and equity are both increased. But opposition will arise as budget decisions move into the trade-offs in region  $ZX'Z'$  where there are gains in efficiency at the cost of increasing the existing inequity, or into region  $Z\Omega Y$  where the students from the best neighborhoods become the worse off.

An operational measure may now be obtained, however, for these trade-offs between efficiency and equity. It requires the choice of an

equity principle from the equity criteria hierarchy above, and a substitution of this choice into the equation given in footnote 13 that gives the general shape and position of the welfare function  $W_0W_0$  in Figure 4. The combination is a significant step, somewhat unique in education, to obtain a measure of the cost of the inequity (at  $Z'$ ) in terms of an efficiency loss ( $X^*\Omega$ ). If commutative equity is chosen,  $W_0W_0$  is flat, and the inequity that exists, <sup>( $X^*\Omega$ )</sup> is valued at zero. A change in the distribution of benefits shifting some expenditure per pupil from group B toward group A would not result in any gain (change in  $W_0 =$  zero). If fiscal neutrality, or proportional equity (i.e., equality of educational opportunity) is chosen,  $W_0W_0$  would be more convex to the origin, and there would be a larger gain measured in efficiency--terms (i.e.,  $X^*\Omega > 0$ ) by changing the distribution of educational benefits among children from  $Z'$ , where they are unequal, to  $\Omega$ , where they are more equal. If positivism is chosen, there is an even more convex welfare function in Figure 4 and a still larger welfare gain (in efficiency terms) through redistributing the benefits to correct for initial inequities.<sup>13</sup>

These trade-offs still incur opposition on behalf of the group who are made worse-off, so emphasizing the humane growth criteria wherever possible holds the greatest promise.<sup>14</sup> The trade-offs between efficiency and equity cannot be completely avoided, but in education there are likely to be many more situations where improvements in equity simultaneously increase efficiency (and vice versa) than is typical of the rest of the economy. The reason is that among working age adults, redistribution of earnings reduces work incentives. Among children,

however, redistribution of educational benefits to achieve greater equality of educational opportunity may actually increase the work incentives of these young persons over their life cycles, without reducing the preparation or work incentives for others. This is partly because there is some evidence of diminishing returns in the high expenditure-per-child school and college districts in the form of smaller percentages of their budgets spent on instruction that is cited by Carroll and Geske. Most important, it is because as children from low income neighborhoods benefit from better preparation, the incentive effect is not negative as it is for welfare payments.

### Conclusion

There are strong nationwide pressures to increase social efficiency in the schools and colleges. These pressures come from the squeeze by energy costs and inflation, from declining enrollments, and from slower economic growth--all reflected in the political climate--and all necessitating internal reallocation. If equity is to be maintained, much less improved, it will be necessary to look more actively for internal sources of funds.

The main efforts to improve efficiency must come at the local school and college levels where the final allocative decisions are made--requiring clear incentives to achieve efficiency, and criteria that can be applied informally and judgmentally. State and Federal levels have a role--states can reduce the budgets for programs that are not cost-effective or socially efficient and increase the incentives for local efficiency by avoiding cost-plus arrangements in the design of categorical programs. State and Federal policies might facilitate competition



and more parental involvement as means of policing the system (and getting homework done by students) where possible. But beyond this, it is likely to be counterproductive if State and Federal levels require too much paper work or intervene directly in the direct management of schools and colleges.

In the effort to improve equity, there are also an important local school board and college trustee and staff planning roles, especially in moderating the strong effects within the local schools on the quality of the schools of wealth disparities among neighborhoods. But given the wide disparities in local wealth among districts, states, and those seeking access to college, there is a necessary state and Federal role. Again, however, equity criteria and measurements are required as informal judgments are made about equity as a part of each decision.

It would be a mistake to underestimate the inefficiency, waste, and inequity in the system. However, it should be clear that it is our belief that the U.S. basically has good schools and good colleges--and that what is needed is more and still better education, not poorer quality, or reduced access. There are unnoticed sources of waste in schools and colleges--ranging from temporarily unutilized cash balances that are not drawing interest, underutilized classroom buildings, underutilized staff as enrollments decline, protectionist admission requirements in fields where there are inflationary pressures and shortages, low secondary school requirements in mathematics and science, higher drop out rates compared to Japan, the USSR, and other rapidly growing nations, and high school graduates with insufficient basic skills, to high levels of subsidy and low admission standards in

fields where there are oversupplies. Inequity furthermore persists as evidenced by the poor quality education found in urban ghettos and the unequal educational opportunities available to children in the poorest neighborhoods and poorest states.

This chapter, finally, has sought to present an overview of the state of the art with respect to the criteria currently available. The operational measures for the "full" private-plus-social projected rates of return are still not sufficiently comprehensive, and the selection of an equity principle requires delicate ethical judgments to be made. But these limitations are not sufficient for ignoring what does exist. For some analysis and information can be quite informative, helping to isolate the missing elements needed in each final judgment, and to make what is already good, better. Such a combination of both efficiency and equity considerations, and use of the humane growth criteria that are suggested, have implications not only for better education, but for the longer run welfare of society as a whole.

References

- Atkinson, Tony, 1970. "On the Measurement of Inequality," Journal of Economic Theory, 2: 244-63.
- Berne, Robert, 1978. "Alternative Equity and Equality Measures: Does the Measure Make A Difference?" Selected Studies in School Finance, Esther Tron, Ed., U.S. Office of Education, Washington, D.C.
- Bowen, Howard R., 1948. Toward Social Economy, Rinehart and Co., New York.
- Cohn, Elchanan, 1979. The Economics of Education, Ballinger, Cambridge, Mass.
- Downs, Anthony, 1957. An Economic Theory of Democracy, Harper & Bros., New York.
- Edgeworth, F. Y., 1925. Papers Relating to Political Economy, Macmillan & Co., London, Vol. 2.
- Hansen, W. L., and Weisbrod, B., 1969. "The Distribution of Costs and Direct Benefits of Public Higher Education," Journal of Human Resources, 4, (Spring), 176-91.
- Heckman, James, 1976. "A Life Cycle Model of Earnings, Learning, and Consumption," Journal of Political Economy, 84, part 2, (August).
- Layard, Richard, and Psacharopoulos, G., 1974. "The Screening Hypothesis and Returns to Education," Journal of Political Economy 82 (Sept.-Oct.): 985-98.
- Lazear, E., 1977. "Academic Achievement and Job Performance: Note," American Economic Review 67 (March): 252-54.

- McMahon, Walter W. and Melton, C., 1978. "Measuring Cost of Living Variation," Industrial Relations 17, No. 3 (October): 324-32.
- \_\_\_\_\_, 1981. "A Cost of Living Index for Illinois Counties and School Districts," reprinted in Selected Studies in School Finance, Esther Tron, Ed., U.S. Office of Education, Washington, D.C.
- McMahon, Walter W., 1970. "An Economic Analysis of the Major Determinants of Expenditures on Public Primary and Secondary Education," Review of Economics and Statistics, (August).
- \_\_\_\_\_, 1971. "Cyclical Growth of Public Expenditure," Public Finance, 26, No. 1, (September).
- \_\_\_\_\_ and Wagner, A., 1981. "Expected Returns to Investment in Higher Education," Journal of Human Resources.
- Odden, Alan, Berne, Robert, and Strefel, L., 1979. Equity in School Finance. Report No. F79-9. Education Commission of the States, Denver, Colorado.
- Psacharopoulos, George, 1972. The Returns to Education, Elsevier Publishing Company, Amsterdam.
- Rawls, John, 1977. A Theory of Justice, Harvard University Press, Cambridge.
- Sahota, Gian S., 1978. "Theories of Personal Income Distribution: A Survey," Journal of Economic Literature, Vol. XVI, No. 1 (March): 1-55.
- Schultz, T. W., 1974. Economics of the Family, University of Chicago Press, Chicago and London.

Windham, Douglas M., Ed., 1979. Economic Dimensions of Education,  
Report of a Committee of the National Academy of Education,  
Washington.

Wise, D. A., 1975. "Academic Achievement and Job Performance," American  
Economic Review 65 (June): 35-66.

Wolpin, K. I., 1977. "Education and Screening," American Economic  
Review 67 (December): 949-58.

### Footnotes

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1. See Jay Chambers, pp. 95 and 101 in Windham, ed. (1979) for effects of community income differences on teacher salaries and then the positive relation between teacher salaries and teacher traits such as years of schooling, years of experience, teacher education in basic disciplines, and teacher verbal ability.
2. This Pareto criterion is the central criterion for efficiency moves in welfare theory. The subsidiary Hicks-Kaldor compensation principle allows for compensation to be provided to disadvantaged parties (e.g., to college students whose program has been eliminated by the state, or to a teacher whose teaching load has been significantly increased). But "hold harmless" clauses reduce to the more central Pareto criterion when the compensation is actually paid (as it often is to facilitate the change) since after the payment of compensation, no one is worse off. The broader definition of economic efficiency relative to Pareto efficiency which includes trade-offs with equity is considered in Part V and in Figure 4 below.
3. Technically, A and B are individuals throughout, but it will be more interesting to think of them as representative of groups of "poor" and "rich" children or young adults. Without assuming additivity of utility, what is said for two individuals here is easily generalizable to three or more.

4. Many persons in educational evaluation are concerned with situations where there are more than two educational outcomes (outputs), and/or more than two inputs. We seek here to simplify the situation to its essentials however, and what is said here for two outcomes (outputs) can be generalized to refer to three or more. Generalizations are developed in Henderson and Quandt (1971, pp. 58-91), and a survey of recent work with educational production functions is offered by L. Lau in Chapter 2 of Windham (1979) and by E. Cohn (1979, Ch. 8).
5. The political pressures on public administrators to minimize the tax costs, while simultaneously maintaining or increasing the benefits, at the risk if this is not done of being replaced, provides incentives in public institutions to be efficient. The point is developed further in the literature on budget determination through voting by Bowen (1948, p. 188), Downs (1957), and McMahon (1970, 1971).
6. A review of educational production functions which summarizes the empirical evidence to date as well as providing an exposition of their basic theoretical elements and the problems in their application is provided by Lawrence J. Lau as Chapter 2 in D. Windham (1979, pp. 33-70).
7. See evidence on the accuracy of expected earnings, in McMahon and Wagner (1981), as well as on female response to these expectations in Ferber and McMahon (1979), for example.
8. For some applications of horizontal equity measures, see Odden, Berne, and Strefel (1979, pp. 13-84). The five least equitable states by most of the measures reported are Virginia, New York,

Wyoming, Georgia, and Pennsylvania. Implications of the choice among measures are considered by Berne (1978).

9. Evidence of a positive relationship between education, earnings, and job performance is developed by Layard and Psacharopoulos (1974), Wise (1975), and Wolpin (1977). The screening hypothesis (or signalling argument) continues to be defended by Lazear (1977).
10. Specifically, one must assume that the marginal utility of each dollar of income declines as income increases, and that the marginal benefit of each dollar's worth of education provided to a child diminishes as the amount of education provided increases. The latter is more debatable when students are being compared who differ with respect to their parental incomes and ability. On efficiency grounds, for example, the more able can learn more from one additional year of education and expenditure than can the less able students. But then, one additional dollar of income may mean more to the less able students later in life.
11. The fact that the interpersonal comparisons of utility that are involved rest on philosophical and ethical grounds, and not on economic grounds, has been mentioned previously.
12. Wealthier tax-paying districts (neighborhoods) will not voluntarily redistribute much to poor districts (neighborhoods) so that too much decentralization of finance eliminates all redistribution.
13. The level of  $W_0 W_0$  in Figure 1 can be described by:

$$(2) \quad W_0 = \frac{1}{\alpha} y_A^\alpha + \frac{1}{\alpha} y_B^\alpha, \quad 0 < \alpha < 1$$



where  $y_A$  and  $y_B$  equals the real expenditure per pupil on A and B. This then requires that an equity principle be chosen from among those presented in the equity hierarchy above to specify the alpha-weights. That is, if  $\alpha = 1$ , social welfare is the simple sum of the real expenditures for A and B. This would correspond to commutative equity because the distribution of expenditure between A and B makes no difference. As  $\alpha = 0$ ,  $W_0 = \log y_A + \log y_B$ , and a given number of dollars can accomplish a larger proportional increase if used to benefit the student who is currently worse-off. This advantage in the use of marginal dollars would continue until benefits are equal, which means that the logarithmic form corresponds to the equality of educational opportunity equity criterion #2. Rawlsian positivism arises as  $y_A$  and  $y_B$  are redefined as outcomes (e.g., lifetime full earnings) or as  $\alpha = -D$ , with increasing degrees of corrective action for the disadvantaged. It then is possible to measure the cost of the loss in equity from redistribution of the benefits using Eq. (2) as the change in  $W_0$  when  $y_B$  increases and  $y_A$  decreases for comparison to the gains from the improvement in efficiency, to see if there is a net gain.

14. It is not uncommon to seek near-consensus on changes, since then the interpersonal comparisons of utility that are involved, and the choice of an equity principle, do not have to be defended in every situation.











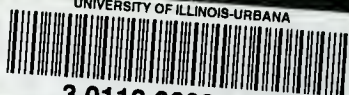
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